I CLAIM AS MY INVENTION:

1. A mechanical breathing aid comprising:

an inspiratory sensor for measuring a tidal volume and pressure of a breathing gas delivered during an inspiration phase of a respiratory cycle, said inspiratory sensor generating ~~inspiratory sensor generating~~ inspiratory sensor output signals representing said tidal volume and pressure;

an expiratory pressure regulator for regulating a gas pressure within an expiration gas flow path dependent on a regulatory signal;

an expiratory pressure sensor disposed to measure an actual gas pressure within said expiration gas flow path, said expiratory pressure sensor generating an expiratory pressure sensor output signal representing said actual gas pressure; and

a control unit operatively connected to said expiratory pressure regulator and to said expiratory pressure sensor, said control unit calculating a target pressure dependent on a compliance value calculated by said control unit from the inspiratory sensor output signals during said inspiration phase, and generating said regulatory signal in said ~~breathing~~ respiratory cycle dependent on a magnitude of a difference between said target pressure and said actual pressurre.

2. A mechanical breathing aid as claimed in claim 1 wherein said control unit calculates said target pressure as an exponential varying function of time with a time constant dependent on said compliance value.

3. A mechanical breathing aid as claimed in claim 2 wherein said control unit calculates said target pressure according to $A + Be^{-t/\tau}$, wherein A and B are constants, t is time, and τ is said time constant.

4. A mechanical breating aid as claimed in claim 3 wherein said control unit selects constants A and B dependent on said compliance value.

5. A control unit which generates a regulatory signal dependent on a magnitude of a difference between a target pressure and a measured gas pressure to contorl an expiratory pressure regulator of a mechanical breathing aid during an expiration phase of a ~~breathing~~ respiratory cycle, said control unit calculating a target pressure as a function of time dependent on a compliance value calculated from pressure and volume measurements of a breathing gas provided by said mechanical breathing aid during an inspiration phase.

6. A ~~mechanical breathing aid~~ control unit as claimed in claim 5 wherein said control unit calculates said target pressure as an exponential varying function of time with a time constant dependent on said compliance value.

7. A ~~mechanical breathing aid~~ control unit as claimed in claim 6 wherein said control unit calculates said target pressure according to $A + Be^{-t/\tau}$, wherein A and B are constants, t is time, and τ is said time constant.

8. A ~~mechanical breating aid~~ control unit as claimed in claim 7 wherein said control unit selects constants A and B dependent on said compliance value.

9. A control unit as claimed in claim 5 which calculates said compliance value from said pressure and volume measurements of said breathing gas provided by said mechanical breathing aid during said ~~breathing cycle~~ respiratory cycle.